Claims 22 and 23 have been added and include the subject matter of claims 3 and 21 rewritten in independent form. Support for new claims 22 and 23 may be found in the specification and original claims 3 and 21.

No new matter has been added by these amendments. Reconsideration and withdrawal of the objections of claims 3, 20 and 21 are respectfully requested.

Rejection Under 35 U.S.C. § 102(a) Based on Heuer

The Examiner has rejected claims 1 and 2 under 35 U.S.C. §102(a) as being anticipated by European Patent Application No. 0 942 316 A2 of Heuer *et al.* ("Heuer"). The Examiner asserts that Heuer teaches an ion storage layer of vanadium or niobium oxide produced by a sol-gel process which may be used for vehicle or building glazing, display elements, optics, mirrors and electromagnetic interference screening. The Examiner further asserts without support that a film of niobium oxide would inherently possess the claimed index of refraction.

To establish inherency, a missing element must necessarily flow from the teaching of the reference. In re Rijckaert, 9 F.3d 1531, 1534, 28 U.S.P.Q. 2d 1955 (Fed. Cir. 1993); In re Oelrich , 666 F.2d 568, 581, 212 U.S.P.Q. 323 (CCPA 1981). The Examiner has not met this burden and therefore the §102 rejection is improper.

Heuer teaches an ion storage layer of vanadium or niobium oxide produced by a sol-gel process. This storage layer is intended for incorporation into an electrochromic system which may then be used for vehicle or building glazing, display elements, optics, mirrors, and electromagnetic screening.

Heuer does not teach, as the Examiner contends, that the high refractive index layer can be made of materials including niobium oxide. Heuer also does not teach or suggest that niobium oxide alone is applicable as a sol-gel-derived high index of refraction layer having a

refractive index of at least 1.90. A high refractive index layer as in the present invention does not necessarily flow from Heuer's mere use of niobium oxide, as the Examiner contends, because niobium oxide materials are not known to have high indices of refraction. Niobium oxide has been suggested for electrochromic applications, but applicants are unaware of its use to produce a high index of refraction layer in a thin film. Thus, Heuer's use of niobium oxide in its invention without any mention of the layer being capable of providing a high index of refraction does not suggest a high refractive index layer.

Further, Heuer does not teach or suggest that niobium oxide is applicable as a sol-gel-derived high index of refraction layer having a refractive index of at least about 1.90. Heuer is not directed to teaching that the use of Nb_2O_5 itself as a high refractive index material is new. As disclosed in the Background of the Invention Section of the present specification, niobium oxide has been used to produce a high index of refraction layer in thin film optical coatings through expensive sputtering and chemical vapor deposition techniques (page 3, lines 26 to page 4, line 2).

Applicants' invention is materially different than that taught by Heuer because applicants' niobium oxide film formed by sol-gel techniques is curable at temperatures below 150° C, which are low enough for use on plastic substrates, while still maintaining a refractive index greater than about 1.90. Applicants have found that by producing the films by sol-gel techniques, such properties can be obtained. Previously, sol-gel derived high refractive index niobium oxide layers were not known (specification at page 4, lines 25-26). Since applicants' coating can be cured at low temperatures, it is thus useful for coating on low-melting substrates such as plastic while still maintaining a high enough refractive index to be used as an "H" layer in a multilayer antireflection coating. For these reasons, there is a material and patentable distinction between the present invention and that of Heuer.

The deposition method taught by Heuer is sputtering. Although such a method is known to be applicable for coating various substrates, sputtering is an expensive process and is highly uneconomical. Applicants have discovered in the present invention a sol-gel-derived layer, which can be cured at temperatures sufficiently low to be useful on substrates like plastics. This sol-gel-derived niobium oxide layer forms the basis for applicants' invention. Heuer does not teach or suggest a niobium oxide high refractive index layer of forming a layer by sol-gel. Therefore, Heuer does not teach or suggest each and every element of claims 1 and 2.

Applicants respectfully traverse the Examiner's rejections of claims 1 and 2 and the arguments in support thereof, for the reasons noted above and request reconsideration and withdrawal of the §102(a) rejection.

Rejection Under 35 U.S.C. § 102(b) Based on Kirlin

The Examiner has rejected claim 1 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,677,002 of Kirlin *et al.* ("Kirlin"). The Examiner contends that Kirlin teaches niobium and tantalum compounds useful as source reagents or precursors in CVD processes. The Examiner also contends that Kirlin discloses refractory materials having unique properties and numerous applications for niobium oxide materials. The Examiner further contends that methods for forming thin films, coatings, or layers of niobium oxide materials including sputtering, PVD, CVD, and sol-gel processing are asserted to be useful for complex geometries as in Kirlin.

Kirlin relates to beta-diketonate alkoxide compounds, which have niobium or tantalum complexed to at least one alkoxide ligand and at least one beta-diketonate ligand. (col. 4, lines 63-66). Kirlin also teaches niobium and tantalum compounds that are useful as source reagents or precursors in chemical vapor deposition (CVD) processes. Kirlin mentions sol-gel processing as an alternative approach for depositing layers of tantalum and niobium oxide

compounds on a substrate. (col. 4, lines 34-36). However, Kirlin does not relate the coating of a substrate, as disclosed in the present invention, with a sol-gel-derived, niobium oxide layer having a high refractive index of at least about 1.90. Therefore, Kirlin does not teach or suggest each and every element of claim 1.

Applicants respectfully traverse the Examiner's rejections of claim 1 and the arguments in support thereof, for the reasons noted above and request reconsideration and withdrawal of the §102(b) rejection.

Rejection Under 35 U.S.C. § 102(e) Based on Eisenhammer

The Examiner has rejected claims 1, 2, 12, and 19 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 5,912,045 of Eisenhammer *et al.* ("Eisenhammer"). The Examiner asserts that Eisenhammer teaches a process for producing selective absorbers wherein dielectrics such as niobium oxide may be converted into an initial solution. The Examiner further asserts that dielectric matrix includes conductive particles and the resulting dispersion or gel is applied to a reflector substrate. Selective properties are allegedly provided by cermet of different layer thicknesses.

Eisenhammer teaches a process for producing a selective absorber, which contains one or more layers of a non-homogeneous material (cermet), where the non-homogeneous material is produced by means of a sol-gel process. The non-homogeneous material consists of a dielectric matrix into which conductive or metallic particles having diameters typically of 5-30 nm are incorporated. (col. 1, lines 14-16). Further, the disclosure of Eisenhammer relates to the production of a material with high absorption in the visible light range while having low absorption in the infrared.

In contrast, applicants' invention provides a low cost, sol-gel derived niobium oxide layer with a high refractive index, and applicants have shown that the use of low temperature curing even allows such layers to be prepared on low-melting substrates such as plastic substrates while maintaining high refractive index values. There is no mention in Eisenhammer of a niobium oxide layer having a high refractive index as claimed. Therefore, Eisenhammer does not teach a low cost, sol-gel derived niobium oxide layer having a high refractive index as in the present invention. Thus, Eisenhammer does not teach or suggest each and every element of claims 1, 2, 12, and 19.

Applicants respectfully traverse the Examiner's rejections of claims 1, 2, 12 and 19 and the arguments in support thereof, for the reasons noted above and request reconsideration and withdrawal of the §102(e) rejection.

Rejection Under 35 U.S.C. § 102(e) Based on Balkus

The Examiner has rejected claims 1, 2, and 11 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,120,891 of Balkus *et al.* ("Balkus"). The Examiner asserts that Balkus teaches transition metal oxide thin films which may be deposited onto a glass substrate by a sol-gel process. The Examiner further asserts that the sol gel can be deposited on a silicon or Mylar® substrate.

Balkus discloses mesoporous transition metal oxide thin films, methods for producing these films, and methods of fabricating useful chemical sensors and electrochromic devices from the thin films. Balkus also discloses that certain mesoporous transition metal oxide molecular sieves may be used as targets for pulsed laser ablation under controlled atmosphere, resulting in deposition of a thin film of the target material upon a substrate of choice. (col. 1, lines 9-12). The films of Balkus are different from the structure and function of the thin film optical coatings of the present invention. There is no mention in Balkus of a niobium oxide layer having a

high refractive index as claimed. Thus, Balkus does not teach a sol-gel derived niobium oxide layer having a high refractive index as in the present invention. Therefore, Balkus does not teach or suggest each and every element of claims 1, 2, and 11.

Applicants respectfully traverse the Examiner's rejections of claims 1, 2 and 11 and the arguments in support thereof, for the reasons noted above and request reconsideration and withdrawal of the §102(e) rejection.

CONCLUSION

In view of the foregoing amendment and remarks, applicants respectfully submit that the pending claims, 1-2, 11-12, 19-20 and 22-23 are patentably distinct from the cited prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

NANNING J. ARFSTEN, *et al.*

11/13/01
(Date)

By: _____

LYNDA L. CALDERONE
Registration No. 35,837
AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P.
One Commerce Square
2005 Market Street - 22nd Floor
Philadelphia, PA 19103-7086
Telephone: (215) 965-1200
Direct Dial: (215) 965-1272
Facsimile: (215) 965-1210
E-Mail: lcalderone@akingump.com

LLC/CJSC:cjsc
Enclosure